WE CLAIM:

1. An apparatus for sensing the current in a power line of a power system, the apparatus comprising:

an enclosure providing a window operable to permit the passage of said power line therethrough;

an active current transformer set within said enclosure and operative to produce a scaled version of said current;

an amplifier coupled with said active current transformer and operative to reduce the phase shift and ratio error between said current and said scaled version of said current;

a powering current transformer set within said enclosure and operative to receive power from said power line on a primary winding and deliver power on a secondary winding;

power supply circuitry set within said enclosure, said power supply circuitry powered through said secondary winding from said powering current transformer and operative to supply power to said amplifier; and

at least one of secondary leads and secondary terminals extending from said enclosure, coupled with said active current transformer and operative to deliver said scaled version of said current outside of said enclosure.

2. The apparatus of claim 1 further comprising a burden set within said enclosure and coupled across said at least one of secondary leads and secondary terminals.

3. The apparatus of claim 1, wherein said amplifier is configured so that the absolute value of said phase shift is below 0.05 degrees when said apparatus is operated over a dynamic range of 50 to 1 of said current to said scaled version of said current.

4. The apparatus of claim 1, wherein said amplifier is configured so that the ratio error is below 0.1% when said apparatus is operated over a dynamic range of 50 to 1 of said current to said scaled version of said current.

5. The apparatus of claim 1, wherein said amplifier is configured to generate a compensation current which zeros the flux in a sense coil within said active current transformer.

6. The apparatus of claim 5 further comprising:

a secondary coil within said active current transformer;

a current divider coupled to said secondary coil;

wherein said current divider is configured to feed a portion of said compensation current into said secondary coil.

7. The apparatus of claim 1, wherein said power supply circuitry comprises:

a shunt coupled with said secondary winding and operative to carry at least a portion of an output current of said secondary winding.

8. The apparatus of claim 7, wherein said power supply circuitry further comprises:

a regulator coupled with said shunt and operative to regulate the flow of current through said shunt.

9. The apparatus of claim 8, wherein said regulator comprises a shunt regulator and further comprising:

a microcontroller operative to sense a current in said secondary winding, and based on said current in said secondary winding, operate said shunt in a linear or switched regulation mode.

10. The apparatus of claim 8, wherein said regulator comprises a linear shunt regulator.

11. The apparatus of claim 8, wherein said regulator comprises a switching regulator.

12. The apparatus of claim 11, wherein said switching regulator comprises a microcontroller.

13. The apparatus of claim 1, further comprising a detector operative to detect when said amplifier is unable to reduce said phase shift and ratio error by an expected amount.

14. The apparatus of claim 13, further comprising an indicator operative to indicate said detection.

15. The apparatus of claim 1, wherein said power supply circuitry is operative to provide power to a device external to said apparatus.

16. The apparatus of claim 1, wherein said power supply circuitry comprises:

a bridge rectifier coupled with said secondary winding and operative to provide a rectified output current from an output current of said secondary winding;

a shunt coupled with said bridge rectifier and operative to selectively shunt current from said secondary winding;

an energy storage device operative to receive a portion of said rectified output current that is not shunted by said shunt;

a regulator operative to sense a voltage of said energy storage device and turn said shunt off when said voltage is below a first threshold and turn said shunt on when said voltage is above a second threshold.

17. The apparatus of claim 16, wherein said regulator comprises a comparator.

18. The apparatus of claim 16, wherein said regulator comprises a microcontroller.

19. The apparatus of claim 18, further comprising:

a sense current transformer coupled to said secondary winding, said sense current transformer operative to provide a signal to a second amplifier;

wherein an output of said second amplifier is coupled to an input of said microcontroller and said microcontroller is operative to sense zero crossings in said output and turn said shunt off near said zero crossings.

20. The apparatus of claim 18, wherein said voltage powers said microcontroller.

21. The apparatus of claim 16 wherein said shunt comprises a MOSFET.

22. The apparatus of claim 21 wherein a core of each of said active current transformer and said powering current transformer is split such that a conductor in said power line can be placed within said window without disconnecting said conductor from said power system.

23. The apparatus of claim 1 wherein a core of each of said active current transformer and said powering current transformer is split such that a conductor in said power line can be placed within said window without disconnecting said conductor from said power system.

24. The apparatus of claim 23 wherein said active current transformer comprises a sense core and a secondary core; said sense core mounted within a groove formed in said secondary core.

25. The apparatus of claim 1 wherein said active current transformer comprises a sense core and a secondary core; said sense core mounted within a groove formed in said secondary core.

26. The apparatus of claim 1 wherein said active current transformer comprises said powering current transformer.

27. The apparatus of claim 1, wherein said at least one of secondary leads and secondary terminals are configured for interconnection to an intelligent electronic device.

28. A system for monitoring individual loads on a power system feeder, the system comprising:

an intelligent electronic device, comprising at least one voltage input configured to be coupled with said power system feeder and a plurality of current inputs configured to sense the current flowing from at least two of the apparatus of claim 1;

wherein the at least two apparatus are configured to sense the current flowing to at least two different loads coupled with said power system feeder;

wherein said intelligent electronic device comprises a processor, an analog to digital converter, and analog circuitry coupled with said voltage input and said current inputs and wherein said intelligent electronic device is configured to calculate at least one power parameter related to each of said at least two different loads.

29. A system for monitoring at least one power parameter in a power line, the system comprising:

an intelligent electronic device comprising at least one voltage input configured to be coupled to said power line; said intelligent electronic device further comprising at least one current input;

at least one of the apparatus of claim 1 coupled with said at least one current input;

wherein said intelligent electronic device is operative to sense signals in said power line, convert said signals to digital representations of said signals and calculate said power parameters; and

wherein said intelligent electronic device comprises a processor, an analog to digital converter and at least one of a display and a communications interface.

30. A method of metering the power importation and power exportation of an independent power producer wherein said power importation is at least 50 times smaller than said power exportation; said method comprising:

mounting only one current sensor on each power line that enters an independent power producer facility for the purpose of monitoring said power importation and power exportation;

coupling at least one output of each of said current sensors to an intelligent electronic device;

coupling at least one voltage input of said intelligent electronic device to each power line;

calculating at least one power parameter with said intelligent electronic device;

wherein an accuracy of measurement of said power parameter is configured to meet a requirement of a revenue meter standard for both of said power importation and said power exportation.

31. The method of claim 30 wherein said power parameter is kilowatt hours.

32. The method of claim 31 wherein said requirement of a revenue metering standard is 0.2% or better accuracy in said measurement of said power parameter over a determined range.

33. The method of claim 31 wherein said revenue metering standard is IEC60687.

34. An apparatus for sensing the current in a power line of a power system comprising:

a current sensor assembly configured to be mounted on said power line;

a first current transformer within said assembly configured to extract operating power for said assembly from said power line;

a current transducer within said assembly configured to sense current flow in said power line;

a transmitter within said assembly configured to transmit a least one digital sample proportional to said current flow to a first receiver within an intelligent electronic device; and;

a second receiver within said assembly configured to receive a time reference, wherein said transmitter is further operative to transmit time information to said intelligent electronic device; said time information indicative of when said digital sample was taken.

35. The system of claim 34 wherein said current transducer is a current transformer.

36. The system of claim 34 wherein said current transducer is a Rogowski coil.

37. The system of claim 34 wherein said transmitter is configured to transmit data over fiber optic cabling and said first and second receivers are configured to receive data over said fiber optic cabling.

38. The system of claim 34 wherein said transmitter is configured to transmit data over a first wireless channel and said first and second receivers are configured to receive data over at least one of said first wireless channel and at least one second wireless channel.

39. The system of claim 34 wherein said current sensor comprises an active current transformer.

40. The system of claim 39 wherein said second receiver is operative to receive said time reference from at least one global positioning satellite.

41. The system of claim 40 wherein said second receiver is further operative to determine a location of said current sensor assembly using said at least one global positioning satellite; and wherein said transmitter is operative to transmit said location to said first receiver.

42. The system of claim 39 wherein said second receiver is operative to receive said time information from a wireless telephone network.

43. The system of claim 42 wherein said second receiver is further operative to determine a location of said current sensor assembly using said wireless telephone network; and wherein said transmitter is operative to transmit said location to said first receiver.

44. The system of claim 34 wherein said second receiver is operative to receive said time information from at least one global positioning satellite.

45. The system of claim 44 wherein said second receiver is further operative to determine a location of said current sensor assembly using said at least one global positioning satellite; and wherein said transmitter is operative to transmit said location to said first receiver.

46. The system of claim 34 wherein said second receiver is operative to receive said time information from a wireless telephone network.

47. The system of claim 46 wherein said second receiver is further operative to determine a location of said current sensor assembly using said wireless telephone network; and wherein said transmitter is operative to transmit said location to said first receiver.

48. The system of claim 34 wherein said second receiver is operative to receive said time information from a very low frequency radio station.

49. An apparatus for sensing the current in a power line of a power system, the apparatus comprising:

an enclosure providing a window operable to permit the passage of said power line therethrough;

an active current transformer set within said enclosure and operative to produce a scaled version of said current; said current containing frequency components substantially within a first range;

an amplifier coupled with said active current transformer and operative to reduce the phase shift and ratio error between said current and said scaled version of said current;

a powering current transformer set within said enclosure and operative to receive power from said power line on a primary winding and deliver power on a secondary winding;

at least one of secondary leads and secondary terminals extending from said enclosure, coupled with said active current transformer and operative to deliver said scaled version of said current outside of said enclosure; and

power supply circuitry set within said enclosure, said power supply circuitry operative to extract power flowing within a second range of frequencies through said at least one of secondary leads and secondary terminals, said power supply circuitry operative to supply power to said amplifier.

50. The apparatus of claim 49 wherein said first range is 4kHz and below and said second range is 400kHz and above.

51. The apparatus of claim 49 wherein said first range covers a frequency range at lower frequencies than said second range.

52. The apparatus of claim 49 wherein said at least one of secondary leads and secondary terminals are operative to deliver said scaled version of said current in the form of digital data.

53. The apparatus of claim 49 wherein said at least one of secondary leads and secondary terminals are operative to deliver said scaled version of said current in the form of a scaled current signal.

54. A method of sensing current the current in a power line of a power system, the method comprising:

magnetizing a power core of a power current transformer with a power line to produce an output current;

generating a supply rail voltage with at least a portion of the output current;

selectively switching a shunt switch between open and closed to regulate the supply rail voltage when the output current is one of at and above a determined threshold, wherein the shunt switch is coupled to shunt at least a second portion of said output current to ground; and

modulating the conductivity of the shunt switch to regulate the supply rail voltage when the output current is below the determined threshold;

magnetizing a secondary core of an active current transformer with the power line to supply a secondary current to a burden; and

compensating for magnetization losses in the secondary core with a compensation circuit that is powered with the supply rail voltage.

55. The method of claim 54, further comprising dividing a compensation current generated by the compensation circuit between the secondary current and a divider resistor.

56. The method of claim 54, further comprising monitoring the compensation circuit to detect when compensation for magnetization losses is insufficient.

57. The method of claim 56, further comprising indicating to a user when said compensation for magnetization loses is insufficient.

58. The method of claim 54, further comprising providing an external device with power from said supply rail voltage.